AGRICULTURAL EXPERIMENT STATION

Library.

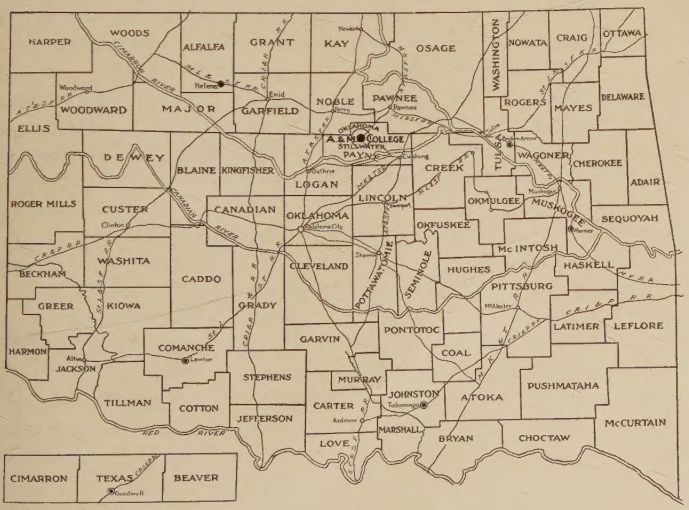
OKLAHOMA
AGRICULTURAL AND MECHANICAL
COLLEGE

AGRICULTURAL EXPERIMENT STATION

CIRCULAR NO. 25 JANUARY, 1914

SWEET POTATOES

BY D. C. MOORING
DEPARTMENT OF HORTICULTURE AND BOTANY



Map Showing Location of A. and M. College and District Agricultural Schools

STILLWATER, OKLAHOMA

SWEET POTATOES

Soil

Sweet potatoes will grow and make fair returns on a great variety of soils ranging from poor to rich and from a light to a heavy soil. Where they are to be grown on a commercial scale proper kind of soil is very important. A well drained, sandy loam soil of moderate fertility is an ideal soil. Sweet potatoes grown on a very rich soil, containing a large amount of organic matter, are very apt to produce an excessive vine growth and very few potatoes. A sandy loam soil is easy to prepare, plant and cultivate. Sweet potatoes grown in a light soil are smoother, yield more, are of better quality, keep better and are easier harvested than when grown in a heavy soil.

Preparation of the Soil

It will always pay to have the soil in good physical condition. Where the soil does not blow, it is best to break the ground six to eight inches deep in the fall or winter and leave it rough until spring. It is not advisable to break the soil too deep for sweet potatoes, especially if the soil is a light one, as this is apt to induce the production of potatoes of greater length and slenderness than is desirable. In this way the soil will catch more moisture, the physical condition will be improved, and more of the chemical elements of plant food will become available.

In case barnyard manure is to be applied, it is better to apply it and disk it in before plowing the soil. In this way the manure will become thoroughly incorporated with the soil and will pretty well decay by planting time. Manure applied in the spring should be well rotted. In the spring the ground should be harrowed and a soil mulch maintained in order to conserve the moisture. A week or ten days before planting time ridges should be thrown up, making them three and a half feet apart. The height of the ridges will depend very largely on the nature of the soil. In light soils it is not necessary to have the ridges more than four to six inches in height; but in case of heavy soils, inclined to pack, the ridges may be made higher.

Propagation

The most common method of propagating sweet potatoes is to bed the potatoes in a propagating bed where they will be exposed to a warm temperature and moisture. Under these conditions the potatoes

will produce shoots, which are commonly termed "slips", "draws" or "sets". Another method of propagation which is frequently employed consists of making vine cuttings. Vine cuttings are made by cutting pieces twelve to eighteen inches long from runners of plants growing in the field. When the season is moist the cuttings need not be as long as eighteen inches. Where the long cuttings are used coil the base end around the hand and place the coil in the ground leaving three or four inches of the top projecting above the ground. Potatoes grown from vines are not as likely to be diseased as when grown from "slips", and for this reason it is a good plan to raise seed potatoes from vine cuttings. On account of vine cuttings usually being set out late, the yield is not heavy nor the potatoes large, but where they are set out fairly early satisfactory results are secured.

Propagating Bed

The bed should be located in a well drained place and protected from the north wind. A pit should be excavated twelve inches deep and about six feet wide, and the length depending on the amount of potatoes to be bedded. Fill the pit to within two inches of the surface of the soil with moist, fresh horse manure, containing one-fourth to one-third part of litter, such as straw. Pack the manure as it is being placed in the pit. In case the manure is dry, pour water over it. It is necessary that the manure contain some litter and be moist, otherwise it will not heat. Cover the manure with two inches of sand or light soil, place a frame sloping to the south over the manure. The frame should be several inches lower on the south side than on the north, the difference in height depending on the kind of covering. The slope should be great enough to shed the water. The cloth covering will require a greater pitch than glass. Place cover supports every three feet apart throughout the length of the frame. These supports should extend from the top of the back to the top of the front of the frame. In case of glass covering, the regular 3x6-foot hotbed sash are used. Canvas or muslin may be used to cover the frame, but in this case the "slips" will not be forced as quickly early in the season.

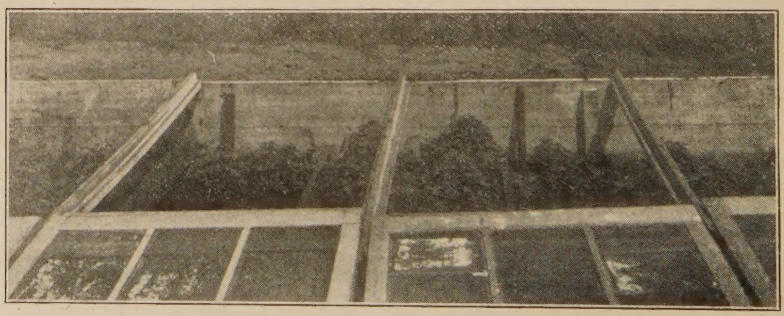


Figure 1.—Section of a hotbed being used for growing sweet potato "slips".

Bedding the Potatoes

The temperature of the bed is apt to run rather high the first few days; therefore, it should be watched, and when the temperature declines to 85° to 90° F. it is ready to receive the potatoes. Small potatoes are more commonly used for bedding on account of not being marketable for table use. It is usually conceded that a bushel of small potatoes will produce more "slips" than a bushel of large ones. The potatoes should be placed close together, but not touching one another, and then covered with four inches of light soil and watered. Five or six weeks will be required to produce "slips" ready to set out. About twenty square feet of surface will be required to bed a bushel of small potatoes. A bushel of potatoes will produce 3,000 to 5,000 "slips".

Management of Propagating Bed

The bed should be kept moist. The watering given at bedding time will last several days, varying according to the brightness of the weather. When the plants begin to appear, more frequent watering will be necessary. Watering at this season of the year should be done in the morning with a rising temperature.

Ventilation on bright days will be necessary even before the plants begin to appear. The temperature should not exceed 90° F. and gradually fall before removing the plants to the open.

Pulling "Slips"

Care should be exercised in pulling the "slips" in order to prevent loosening the potatoes. This may be done by pressing on the seed potato with one hand and removing the "slips" with the thumb and finger of the other hand.

When the slips are three to four inches tall they are ready to remove from the bed. Should they not be removed, but be permitted to remain in the bed, they will take nourishment from the potatoes and thus lessen the number of "slips" that would otherwise be produced. In case it is not convenient to set the plants when removed, trenches may be dug and the roots covered, placing the plants close together. The soil around the roots should be kept moist.

Setting Plants

The sweet potato is a very tender plant, and therefore very sensitive to frost. The plants should not be set in the open until all danger of frost is past.

Previous to setting the plants, the ridges should be harrowed, which will leave the surface of the soil fine and moist. Eighteen inches is a good average distance apart to set the plants in the row. Where the plants are set in rows three and one-half feet apart and eighteen inches apart in the row, 8,297 plants will be required to set an acre.

When large areas are to be set a transplanting machine is a very necessary tool unless labor is very plentiful. The main features of a transplanting machine are a device for making an opening to receive the plant, a tank for holding water, and attachments to firm the soil around the plant. An average of three to four acres can be set per day with a transplanting machine. A transplanting machine which is to be used to plant on ridges should have a truck attachment for straddling the rows. Another advantage of a transplanting machine is that it is not necessary to wait on the season to transplant, as the machine waters each plant as it is set.

Small areas are usually set by hand, making the opening to receive the plant with either the hand, stick, planting trowel or spade. In planting with a spade an opening to receive the plant is made by pushing the spade into the ground with the foot and then pressing forward on the handle. The plant is inserted, the spade withdrawn and the soil firmed against the plant with the foot.

In case the surface of the soil is dry or cloddy, the blade of the spade is brought forward when the lower edge is within an inch of the surface of the soil when withdrawing the spade. In this way the dry soil or clods are raked away from the opening and there is no danger of any soil except pulverized, moist soil being pressed against the roots of the plants.

The essential points in setting out plants, regardless of the method, are: Place the roots in moist, pulverized soil, make the opening large enough so the roots may be spread out, press the soil firmly about the roots. Where roots are puddled, do not permit the mud to dry on the roots before planting.

The following are the names of some transplanting machines, dealers and their addresses:

"Tiger Transplanter", Parlin & Orendorff Plow Company, Oklahoma City, Oklahoma.

"F. & J. Bemis Transplanter", Madison Plow Company, Madison, Wisconsin.

"The New Rollman Transplanter", New Ideal Spreader Company, Coldwater, Ohio.

"J. I. Case", J. I. Case Plow Works, Racine, Wisconsin.

"Nagley Automatic", Nagley Manufacturing Company, Lyons, New York.

"Owens Automatic", J. G. Owens Company, Minneapolis, Minnesota.

Cultivation

Harrowing the rows just before setting out the plants will leave a soil mulch on the ground which should be maintained until the vines prevent cultivation. After each rain or irrigation a cultivation should be given to prevent the loss of moisture. Occasional hoeing may be

necessary to keep down the weeds. The soil should be worked to the plants at the last cultivation. Where irrigation is depended upon for moisture, most of the water should be applied between the time when the plants are set and the time when the vines cover the ground. Irrigation continued too late will cause an excessive vine growth and small crop of immature, stringy potatoes.

The results of available experimental data show that lifting of vines does not pay. By lifting is meant the raising of plants to prevent their rooting at joints. Results of pruning vines also showed a decrease in yield. The greater the amount of pruning the smaller the yield.

Varieties

The following varietal notes are based on variety tests made at this Station. Our soil varies from a clayey loam to a heavy clay. Since the relative value of varieties depends largely on the locality, it may be that the results obtained under other conditions will vary from those secured here:

Yellow Jersey.—Vines small, similar to Yellow Nansemond. Potatoes below medium size, long and slender. Skin deep yellow. Flesh yellow, dry and not sweet. Not productive and only fair keeper. Not very promising here.

Early Golden.—Medium heavy vine growth. Potatoes below medium in size, many small ones, irregular shape, short and thick. Skin rather light with a slight yellow tinge. Flesh yellowish white, juicy and fairly sweet. Only moderate yield and has not kept well.

Vineless.—Vigorous vines but not long. Potatoes large, short, thick, and blunt pointed. Skin white. Flesh white, juicy and sweet. Only a fair yielder and keeper.

Pride of Kansas.—Vines do not make a heavy growth. Potatoes slightly below medium size, rather long and cylindrical. Skin yellow. Flesh yellow, sweet, but rather dry. Yield only fair and has not kept well.

Sadies Prolific.—A variety obtained from a local grower in Arkansas. Light vine growth. Potatoes very small, long and slender. Skin deep yellow. Flesh almost white, dry and not sweet. Poor yielder and has not kept well.

Southern Queen.—Vines made very heavy and vigorous growth. Potatoes large, medium short and thick, blunt pointed. Skin white. Flesh very light cream yellow, juicy, only fairly sweet. Productive and good keeper. One of the best light flesh-colored potatoes.

Bradley Yam.—Vine growth heavy and vigorous, runners not as long as Southern Queen. Potatoes above medium in size, rather thick

at end of attachment and tapering to other end. Skin yellow. Flesh deep yellow, fairly juicy and sweet. Productive and a good keeper. A popular variety in this State.

Triumph.—Strong vine growth. Potatoes large, medium length, thick. Skin light yellow. Flesh orange yellow, only fairly juicy, sweet. Productive and a good keeper. Very popular in Southern States, especially for an early potato. Quality not so good when kept in storage late on account of becoming dry.

Nancy Hall.—Vines made heavy growth, vigorous. Potatoes above medium size, extra long and slender. Skin light yellow. Flesh light yellow, very juicy and sweet. Productive and a good keeper. This variety is highly recommended by the Arkansas Sweet Potato Growers' Association. From results obtained here this year this variety seems promising for this State.

Yellow Nansemond.—Vines small, foliage not abundant. Potatoes medium size, long and slender. Skin deep yellow. Flesh white and light yellow tinge, dry and only fairly sweet. Only fair producer. Good keeper.

Harvesting and Storing Sweet Potatoes

Time of Harvesting.—Sweet potatoes which are to be stored should be left in the ground until mature if the climatic conditions are favorable. By breaking a sweet potato and exposing the broken surface to the air it will become dry if mature. A light frost on the vines will not injure the potatoes, but they should not be left in the ground until after a killing frost where it can be avoided. In case a killing frost does occur before digging the potatoes, the vines should be cut off immediately. A frosted potato or one which has been allowed to remain connected with frosted vines has a bitter taste and will not keep well. Harvesting should be done when the soil is dry and the weather is bright and clear. Potatoes taken from a dry soil are clean, and thus the bruising is avoided which is incurred in cleaning the potatoes when taken from a wet soil.

Method of Harvesting.—Every precaution should be taken in digging and handling sweet potatoes in order to prevent bruising them. In some cases the vines are cut off with hoes previous to digging, but this is a slow and expensive process. A potato digger with rods attached to the moldboard and a double rolling coulter on the beam to cut the vines is the usual tool for plowing out the potatoes. An ordinary lister or turning plow with a single rolling coulter fastened to the beam is quite frequently used. Care should be exercised in getting the plow deep enough to prevent cutting or bruising the potatoes. Digging should cease early enough in the afternoon to give the potatoes an hour or two to dry out before picking them up as they should not be left exposed over night.

The grading may be done in the field or at the storage place. If the grading is done in the field, an extra handling is avoided, thus the chances for bruising is lessened. Grading in the field is done in picking up the potatoes. The broken, bruised or diseased potatoes should be separated from those intended for storage, and disposed of as soon as possible, as it does not pay to attempt to keep them. The potatoes for storage should be graded according to size and placed in separate baskets. Padded baskets should be used in gathering in order to prevent bruising the potatoes. The filled baskets should be loaded in a wagon which has springs and taken direct to the storage place. Gathering potatoes in sacks and loading them in a wagon without springs, or pouring them in the wagon box loose to be hauled a long distance, is a very bad practice.

Importance of Storing Potatoes.—One of the chief difficulties in the sweet potato industry is keeping the potatoes during the winter. In the fall at harvesting time the potatoes are usually cheap, but during the winter and spring the price increases. At present there are a number of ways in which potatoes are stored, among which may be mentioned: The potato bank, cellar, cave or dugout, and regular houses constructed for the purpose. The main essentials in storing sweet potatoes so far as the storage place is concerned, are: (1) It should be readily dried out; (2) an even temperature easily maintained; (3) and good ventilation provided.

Potato Bank.—Select a well drained place, mound the soil three inches high and level the surface, forming a circle eight or ten feet in diameter. Dig two trenches at right angles crossing each other at the center of the circle. Place boards over the trenches except at the intersection. Construct a loose ventilator shaft of boards and place it upright over the intersection. A loose bundle of corn stalks is frequently used as a ventilator. A layer of straw three inches thick is placed over the surface inclosed in the circle. The potatoes are piled around the ventilator shaft on the straw. Not more than twenty-five or thirty bushels are stored in a bank. A layer of straw two or three inches thick is placed over the potatoes and dirt is placed over the straw to a depth sufficient to prevent freezing. It is not necessary to place all the soil on at first, but this layer may be increased as the weather becomes colder. During very cold weather the ventilators should be closed. A temporary covering which will shed the water should be built over the bank. Some seasons potatoes keep very satisfactorily in these banks, but frequently they do not. This has resulted in the growers seeking a better way to store their potatoes.

Cellars and Caves.—Where cellars or caves are available they may be used, provided they may be kept dry, an even temperature maintained and ventilation supplied. In the construction and arrangement of bins, heating apparatus, ventilators, etc., the same general principles

will apply as in the case of the wooden storage house described later.

Wooden Sweet Potato Houses.—The size of the house will depend on the amount of potatoes to be stored, but the principles of construction are the same for a small as for a large house. It is easier to maintain uniform conditions in a large house than in a small one. A house twenty feet wide is a very convenient width on account of the arrangement of the bins inside. This will provide for a row of bins seven and a half feet wide on each side with a three-foot alleyway in between. The floor should be elevated above the ground in order to permit free circulation of air from below. Provide durable and substantial pillars, sills and sleepers. The studding should be of 2x4-inch material. The first inside layer of the floor, walls and ceiling may be of rough boards or of shiplap one inch thick, over which is placed a layer of building paper, followed by regular four-inch flooring. The first layer on the outside may be of rough lumber or shiplap, then a layer of building paper, followed by a layer of siding.

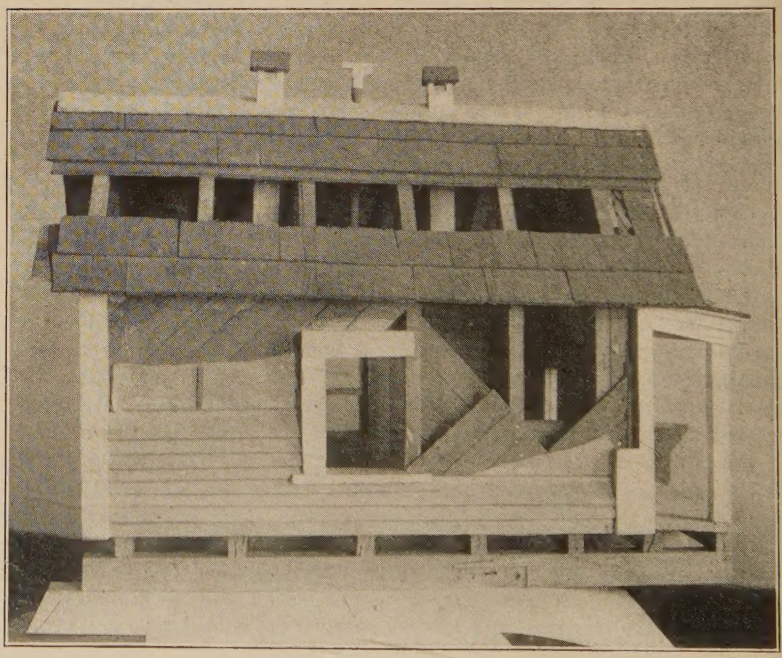


Figure 2.—Model of a wooden sweet potato storage house.

Do not fill the space in between the walls with sawdust or any other material, but leave it as a dead air space. Sawdust or other similar material placed in between the walls may become moist and eventually rot the walls.

The rafters should be covered with shiplap lumber over which any of the common roofing materials may be placed.

A glass window in the rear end, in case the house is a small one, or two or three windows in each side in a large house, will admit light so work may be done inside, and such windows may be inserted without materially changing the inside conditions. Tight-fitting double wooden shutters should be provided for the windows, which may be closed during cold weather. A very heavy door or an inner and outer door will be necessary.

It is very important that plenty of ventilation be provided in order that cool air may enter and moist, warm air may pass out. Construct four trapdoors in the floor, one in each corner of the room, for the admission of air from below. Two ventilators with 8x8-inch openings should extend through the ceiling and roof. The ventilators should be capped so as to prevent rain entering through them and also provided with shutters at the lower end to be closed during cold weather. A flue will be necessary to accommodate a stove, which should be placed near the center of the house. All openings should be so constructed that they may be readily and tightly closed.

As mentioned above, a house twenty feet wide will accommodate a row of bins seven and a half feet long on each side with a three-foot alley through the center of the house. Four feet is a good width for the bins. In the construction of the bins provision should be made for the circulation of air under and around each bin. This may be accomplished by using 2x4-inch material for the uprights and for supporting the bottom of the bins. Use 1x4-inch material for the floors and sides, leaving an inch crack between the boards. The lower end of the upright supports should be nailed to the floor and the tops to the ceiling. The ends of the bins next to the walls should be nailed on the uprights before they are fastened in place, as the outside of the bin should not be more than six inches from the wall of the house. In addition to the corner supports of the bins, an additional one in the center of the seven and a half-foot length will be necessary. By nailing boards on each side of the upright supports separating the bins an air space will be formed between the bins. It is desirable to have false bottoms in the bins so they may be removed when it is desired to clean out and disinfect the house. Use 2x4-inch material for the floor supports and leave one-inch cracks between the floor boards. The ends of the bins next to the alley may be put on as the bins are filled. In many instances a building may be available which may be converted into a storage house. Crates may be substituted for bins.

Storing.—Previous to storing, the house should be thoroughly disinfected and dried out. Spray all parts inside with a formalin solution consisting of a pint of formalin to twenty gallons of water. Build a fire in the stove and dry out the house thoroughly before placing any potatoes in it. The bins should be filled by layers rather than filling

one at once, as this will give them a better chance to dry out. During the first ten days to two weeks the potatoes are stored the temperature should be held at 85° to 90° F. in order to dry out the potatoes. The ventilators should be left open to permit the moist air to pass out unless it is very moist or rainy outside. If it is very cold, open the ventilators only partially. When the potatoes are dried out lower the temperature to 55° F., and maintain as near this temperature as possible. This may be done by opening the house during the night in case the temperature inside increases. Should the temperature decline below 55° F., the fire should be renewed. Some ventilation should be continued throughout the storage period except during rainy or very damp weather. In case the atmosphere inside becomes moist, a little firing will be necessary in order to dry it out. The shrinkage of potatoes during storage will vary from 10 to 16 percent, depending on the variety and the firing.